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10/027,784	12/19/2001	Paul V. Long	20030/87:1	9581

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EXAMINER
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2851	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/027,784	Applicant(s) LONG ET AL.
	Examiner Michelle Nguyen	Art Unit 2851

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for R ply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 January 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-5 and 8-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-5 and 8-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to the rejection(s)of claim(s) 1-23 under 35 U.S.C. 102 and 35 U.S.C. 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of newly found prior art.

Examiner notes the cancellation of claims 2, 6 and 7.

Claim Objections

2. Claim 1 is objected to for the following reason(s):

(a) In line 7, "reflective imaging devices" should be --micromirror display devices--.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 4, 5, 8, 10-13, 18, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,371,617 to Nishida et al. in view of U.S. Patent No. 6,318,863 to Tiao et al.

With regard to claim 1, Nishida et al. disclose an image projection system (projector 3000) comprising (see Fig. 10):

a projection lens (projection lens 300) (Fig. 10);

a dichroic cross-combiner assembly (prisms 420, 430, 440) having sides with one side (side face 420I) facing the projection lens 300 (see Fig. 10);

three micromirror display devices (micro-mirror-type optical modulation devices 200B, 200R, 200G), each including an array of digitally deflected mirrors (micro-mirrors 204) positioned facing a side (side faces 420O, 430O, 440O, respectively) of the prisms 420, 430, 440 (see Col. 5, lines 1-6, Figs. 4(A), 10); and

a light source apparatus (illuminating optical system 100B) generating blue, green and red light and positioned such that the three modulation devices 200B, 200G, 200R respectively receive the blue, green and red light and reflect the blue, green and red light through the prisms 420, 430, 440 toward the projection lens 300 (see Fig. 10).

Nishida et al. do not teach the explicitly illuminating optical system 100B to be a coherent light source apparatus generating narrow bands of blue, green and red light. However, Tiao et al. teach employing in an image projection system a coherent light source apparatus comprising laser diodes, which are advantageous in use due to their low power consumption, long lifetime and generation of low thermal energy (see Col. 1, lines 62-6, Col. 3, lines 25-30). Therefore, it would have been obvious to one having ordinary skill in the art the time the invention was made to replace the illuminating optical system of Nishida et al. with the coherent light source apparatus of Tiao et al. for reducing power consumption among several advantages.

With regard to claim 4, it is understood that the laser diodes of Tiao et al. as discussed above with respect to claim 1 include light emitting diodes.

With regard to claim 5, it is understood that the laser diodes of Tiao et al. as discussed above with respect to claim 1 include lasers.

With regard to claim 8, Nishida et al. teach the micro-mirrors 204 as discussed above with respect to claim 1 to each be quadrilateral (square) and pivotable about a diagonal axis (rotation axis 204c) (see Col. 5, lines 1-10, Fig. 4(A)).

With regard to claim 10, Nishida et al. teach the illuminating optical system 100B as discussed above with respect to claim 1 to be positioned such that the three modulation devices 200B, 200G, 200R respectively receive blue, green and red light at an oblique angle of incidence (see Figs. 5(A), 5(B), 10).

With regard to claim 11, Nishida et al. do not teach explicitly the modulation devices 200R, 200G, 200B and the projection lens 300 as discussed above with respect to claim 1 to be positioned in a first plane and the illuminating optical system 100B to deliver light from a second plane. However, it would have been an obvious matter of design choice for one having ordinary skill in the art at the time the invention was made to position the modulation devices and projection lens of Nishida et al. in one plane such that the illuminating optical system delivers light from another plane for improving the compactness of the projector. Further, applicant has not disclosed that the specific placement of the micromirror display devices and the projection lens with respect to the light delivered from the light source apparatus solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the

micromirror display devices and projection lens positioned anywhere with respect to the light delivered from the light source apparatus.

With regard to claim 12, Nishida et al. teach the illuminating optical system 100B as discussed above with respect to claim 1 to be positioned below (to the left of) the prisms 420, 430, 440 (see Fig. 10).

With regard to claim 13, Nishida et al. teach each of the modulation devices 200B, 200G, 200R as discussed above with respect to claim 1 to include reflective pixels that are adapted to selectively reflect the respective blue, green and red light towards one of the projection lens 300 or a light-absorbing surface in proximity to the projection lens 300 (see Col. 1, lines 15-21, Col. 10, line 66 to Col. 11, line 63, Fig. 10).

With regard to claim 18, Nishida et al. teach the prisms 420, 430, 440 as discussed above with respect to claim 1 to be adapted to simultaneously receive the blue, green and red light from the respective modulation devices 200B, 200G, 200R and to combine the blue, green and red light to form a composite image directed toward the projection lens 300 (see Fig. 10).

With regard to method claims 21 and 22, the structure of the combined invention of Nishida et al. and Tiao et al. as discussed above with respect to claims 10 and 18 renders the steps set forth in the method claim inherent to the operation of the combined invention.

5. Claims 3 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishida et al. in view of Tiao et al. as applied to claim 1 above, and further in view of U.S. Patent No. 5,159,485 to Nelson.

With regard to claim 3, Nishida et al. do not teach the projector 3000 as discussed above with respect to claim 1 to further comprise three pairs of lenses. However, Nelson teaches adding to a projection system a pair of anamorphic lenses, the pair including an expanding lens (element 206) and a collimating lens (lens 104) for optimizing optical efficiency, and being positioned between a light source (light source 11) and a micromirror display device (DMD 40) (Col. 2, lines 37-43). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add to the projector of Nishida et al. three pairs of anamorphic lenses as disclosed by Nelson such that each pair is positioned between the illuminating optical system and a modulation device for optimizing optical efficiency.

With regard to claim 23, the structure of the combined invention of Nishida et al. and Tiao et al. as discussed above with respect to claim 3 renders the steps set forth in the method claim inherent to the operation of the combined invention.

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishida et al. in view of Tiao et al. as applied to claim 1 above, and further in view of U.S. Patent No. 6,396,619 to Huibers et al.

With regard to claim 9, Nishida et al. do not teach the micro-mirrors 204 as discussed above with respect to claim 1 to each be quadrilateral and pivotable about a longitudinally centered axis. Instead, Nishida et al. teach the micro-mirrors 204 to each be quadrilateral and pivotable about a diagonal axis. However, Huibers et al. teaches that it is an obvious matter of design choice to provide a micromirror display device with an array of digitally deflected mirrors that are pivotable about a longitudinally centered

axis (see Figs. 7A, 8, 9, 10). Applicant has not disclosed that the axis about which the digitally deflected mirrors pivot solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with digitally deflected mirrors being pivotable about any known axis. Therefore, it would have been an obvious matter of design choice to one having ordinary skill in the art at the time the invention was made to substitute for the diagonal axis of Nishida et al. a longitudinally centered axis as taught by Huibers et al.

7. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishida et al. in view of Tiao et al. as applied to claim 1 above, and further in view of U.S. Patent No. 6,155,687 to Peterson.

With regard to claim 14, Nishida et al. do not teach a light-absorbing surface in proximity to the projection lens 300 as discussed above with respect to claim 13. However, Peterson teaches that it is well known in the art to add to an image projection system a light-absorbing surface (light-absorbing surface 66) in proximity to a projection lens (projection lens 52) (see Fig. 2). Further, Peterson teaches the light-absorbing surface 66 to be positioned on a frame (optical frame 54) around the projection lens 52 (see Col. 2, lines 33-8, 46-50, Fig. 2). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add to the projector of Nishida et al. a well-known light-absorbing surface as shown by Peterson for preventing unwanted light from being projected by the projection lens, and thereby for improving display performance.

8. Claims 15-17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishida et al. in view of Tiao et al. as applied to claim 1 above, and further in view of U.S. Patent No. 5,658,060 to Dove.

With regard to claim 15, Nishida et al. do not teach the prisms 420, 430, 440 as discussed above with respect to claim 1 to include an X-cube. Instead, Nishida et al. teach the prisms 420, 430, 440 to include a three-prism assembly (see Fig. 10). However, Dove teaches the substitution of a cross prism, or an X-cube, for a three-prism assembly, thereby further teaching a cross prism and a three-prism assembly to be art-recognized equivalents (see Col. 3, lines 15-8). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute for the three-prism assembly of Nishida et al. a cross prism as taught by Dove for providing an alternative means for recombining rays of light.

With regard to claim 16, Nishida et al. do not teach explicitly the sides of the prisms 420, 430, 440 as discussed above with respect to claim 1 to be rectangular. However, Dove teaches the substitution of a cross prism, or an X-cube having rectangular sides, for a three-prism assembly as disclosed by Nishida et al., thereby further teaching a cross prism and a three-prism assembly to be art-recognized equivalents (see Col. 3, lines 15-8, Fig. 3). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to replace the three-prism assembly of Nishida et al. with a dichroic cube as taught by Dove for providing an alternative means for recombining rays of light.

With regard to claim 17, Nishida et al. do not teach the prisms 420, 430, 440 as discussed above with respect to claim 1 to comprise two X-cubes. Instead, Nishida et al. teach the prisms 420, 430, 440 to include a three-prism assembly (see Fig. 10). However, Dove teaches the substitution of one or more cross prisms, or X-cubes, for a three-prism assembly, thereby further teaching a cross prism and a three-prism assembly to be art-recognized equivalents (see Col. 3, lines 15-8, Figs. 2-4). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute for the three-prism assembly of Nishida et al. two cross prisms as taught by Dove for providing an alternative means for recombining rays of light.

With regard to claim 19, Nishida et al. do not teach the projector 3000 as discussed above with respect to claim 1 to further comprise three field lenses. However, Dove teaches adding to a projection system three field lenses (correcting lenses 72, 74, 76) for maximizing display performance (see Col. 3, lines 35-43, Fig. 5). Further, Dove teaches each of the correcting lenses to be positioned between a light valves and a respective side of a dichroic cross combiner assembly (see Fig. 5). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add to the projector of Nishida et al. the field lenses of Dove for maximizing display performance.

9. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishida et al. in view of Tiao et al. as applied to claim 1 above, and further in view of U.S. Patent No. 5,760,875 to Daijogo et al.

With regard to claim 20, neither Nishida et al. nor Tiao et al. specify the width of the bands of blue, green and red light. However, Daijogo et al. teaches a narrow band of green light having full-width half-maximum spectra of less than about 40 nanometers to render a satisfactory hue of the color green (see Col. 18, lines 2-6). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the illuminating optical system of Nishida et al. such that the widths of the bands of color render satisfactory hues of blue, green and red as taught by Daijogo et al.

Conclusion

10. The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

U.S. Patent No. 6,100,103 to Shim et al. teaches LEDs to have the advantages of high radiation efficiencies and long life time.

U.S. Nakazawa et al. teaches LCDs and DMDs to be well-known art-recognized equivalents with respect to their use for modulating a light beam with image information

U.S. Patent No. 6,147,790 to Meier et al. teaches a micromirror display device including an array of digitally deflected mirrors that are each quadrilateral and pivotable about a diagonal axis.

U.S. Patent No. 6,526,198 to Wu et al. teaches a micromirror display device including an array of digitally deflected mirrors that are each quadrilateral and pivotable about a longitudinal axis.

U.S. Patent No. 6,525,759 to Kawai teaches a micromirror display device including an array of digitally deflected mirrors that are each quadrilateral and pivotable about a longitudinally centered axis.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Nguyen whose telephone number is 703-305-2771. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Russ Adams can be reached on 703-308-2847. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4900.

RUSSELL ADAMS
SUPERVISORY PATENT EXAMINER
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mpn
March 3, 2003